

GEST

GODDARD EARTH SCIENCES AND TECHNOLOGY CENTER

Quarterly Report

Cooperative Agreement NCC5-494

Reporting Period: January 1, 2003 through March 31, 2003

UMBC

AN HONORS UNIVERSITY IN MARYLAND

1000 Hilltop Circle
Baltimore, MD 21250

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Technical Status Report

The following is a technical report of the progress made under Cooperative Agreement NCC5-494, the Goddard Earth Sciences and Technology Center (GEST). The period covered by this report is January 1, 2003 through March 31, 2003

Overview of significant Activities

Advertisement of summer programs as noted below:

SUMMER PROGRAMS – GSSP, GCR, VSEP, HCP

VSEP 2003

2003 Graduate Student Summer Program in Earth System Science (GSSP)

Target

Graduate students in Earth science and related disciplines

About the Program

The Goddard Space Flight Center's Earth Sciences Directorate, in collaboration with the Goddard Earth Sciences and Technology (GEST) Center with headquarters at the University of Maryland Baltimore County, is offering a limited number of graduate student research opportunities. The program is scheduled for June 9 to August 15, 2003, and is designed to stimulate interest in interdisciplinary Earth science studies by enabling selected students to pursue specially tailored research projects in conjunction with Goddard scientific mentors. This year's theme and introductory seminar series will be Radiation Effects of Aerosols and Clouds on Climate.

Introduction

The Goddard Space Flight Center (GSFC) is recognized as a world leader in the application of remote sensing and modeling aimed at improving knowledge of the Earth system. The Goddard Earth Sciences Directorate is playing a central role in NASA's Earth Observing System (EOS) and the U.S. Global Change Research Program. GEST is a consortium of universities and corporations (University of Maryland Baltimore County, Howard University, Hampton University, Caelum Research Corporation and Northrop Grumman Corporation) organized as a cooperative agreement with the GSFC to promote excellence in the Earth sciences. The program's goal is to attract and introduce promising students to Earth system science career options through hands-on educational research experiences in the Earth sciences at NASA.

Program Activities

Research Projects: Each student will be teamed with a NASA scientist mentor with parallel scientific interests to jointly develop and carry out an intensive research project at GSFC over the ten-week period. NASA mentors will be drawn from within the four participating Earth Science laboratories at Goddard: The Laboratory for Atmospheres, The Goddard Institute for Space Studies (in New York City), The Laboratory for Hydrospheric Processes, and The Laboratory for Terrestrial Physics. Students will be expected to produce final oral and written reports on their summer research activities.

Examples of past summer research projects include: Applying the Mesoscale Model 5 for a regional climate study; Adaptation of the Global Circulation Model for use on Jupiter; Assimilation of satellite surface temperature data into a land surface model; Characterization of aerosol relative humidity with their radiative properties; Characterization of forest canopy structure with a high-resolution imaging laser; Assimilation of TRMM lightning and radar data in regional numerical prediction models; Analysis of TOMS aerosol data with model based predictions; Cloud screening procedures to improve radiometric data sets from Saharan desert dust over Puerto Rico; and Coupling a planetary boundary layer model to the Global Land Data Assimilation System.

In addition, students are required to participate in an introductory lecture series and in informal weekly lunch discussions with GSFC researchers. Students may also have the opportunity to tour key NASA facilities and meet with NASA and industry scientific leaders.

Eligibility and Selection Criteria

The program is open to students enrolled in or accepted to accredited U.S. graduate programs in the Earth, physical or biological sciences, mathematics, or engineering disciplines. Students will be selected on the basis of academic record, demonstrated motivation and qualification to pursue multidisciplinary research in the Earth sciences, clarity and relevance of stated research proposal to NASA programs, and letters of recommendation. Preference will be given to students who have completed at least one year of graduate study. Minorities, women, and those with disabilities are encouraged to apply. GEST is an Affirmative Action/Equal Opportunity Employer.

Students must commit for the full ten-week period (June 9 - August 15, 2003). Participants must be either U.S. citizens or foreign nationals in U.S. schools who are either permanent residents or who possess a valid F1 visa. All selected students will be subject to a pre-employment security background check under the current security guidelines.

Application Material

A formal application may be obtained by contacting Anatheia Brooks by mail or email (see information below). The application package should include:

1. Completed application form
2. Updated Curriculum Vitae

3. At least two letters of reference
4. Undergraduate/graduate transcripts

Compensation and Support

Students will be paid the equivalent of \$10/hour for forty hours per week over the ten-week period. In addition, GEST will reimburse reasonable domestic travel expenses for participants needing to relocate to the Greenbelt, MD area. Housing for the program participants only will be provided at program expense (alternate or additional accommodations cannot be supported). Transportation to and from NASA's GSFC will be provided daily.

Deadline

Applications must be received no later than March 7, 2003. Selection announcements will be made before April 4, 2003.

Contact Information

All application materials should be directed to:

L. Anathe Brooks, Assistant Director
GEST Center, Mail Code 900.1
NASA Goddard Space Flight Center
Greenbelt, MD 20771

Email: abrooks@pop900.gsfc.nasa.gov
Telephone: 301 286 4403

2003 Goddard Coastal Research Graduate Fellowship Program (GCR)

Target

Graduate students in physical and biological oceanography and related disciplines

About the Program

The Goddard Space Flight Center's Earth Sciences Directorate and Wallops Flight Facility, in collaboration with the Goddard Earth Sciences and Technology (GEST) Center, led by the University of Maryland Baltimore County, is offering a limited number of graduate student research opportunities. This new program is scheduled for June 2 to August 8, 2003. It is designed to stimulate interest in interdisciplinary Earth science studies by enabling selected students to pursue specially tailored research projects on coastal processes in conjunction with Goddard scientific mentors during the program period.

Introduction

The Goddard Space Flight Center (GSFC) is recognized as a world leader in the application of remote sensing and modeling aimed at improving knowledge of the Earth system. The Goddard Earth Sciences Directorate plays a central role in NASA's Earth Observing System and the U.S. Global Change Research Program. GEST is organized as a cooperative agreement with the GSFC to promote excellence in the Earth sciences, and is a consortium of universities and corporations (University of Maryland Baltimore County, Howard University, Hampton University, Caelum Research Corporation and Northrop Grumman Corporation).

The aim of this new program is to attract and introduce promising students in their first or second year of graduate studies to Oceanography and Earth system science career options through hands-on instrumentation research experiences on coastal processes at NASA's Wallops Flight Facility on the Eastern Shore of Virginia.

Program Activities

Research Projects: Each student will be teamed with a NASA scientist mentor with parallel scientific interests to jointly develop and carry out an intensive research project over the ten-week period. Most research will be done at GSFC's Wallops Flight Facility, however there is the possibility that students will have the opportunity to participate in field programs at other locations as well. NASA mentors can include any Goddard Earth Scientist, but most will be drawn from within the Observational Sciences Branch (<http://osb.wff.nasa.gov/>). Students will be expected to produce final oral and written reports on their summer research activities. The experience will likely help students to enrich their thesis or dissertation topic choices, and broaden their scope of research tools.

Instrumentation Available: Some of the instruments available for students to learn and use are listed below.

- **Airborne Oceanographic LIDAR** - Retrieval of oceanic inherent optical properties by use of laser-induced fluorescence of phytoplankton and chromophoric dissolved organic matter (CDOM) concurrently with water Raman emission. Recent applications include satellite algorithm development for the global retrieval of the absorption coefficients of phytoplankton and CDOM together with the total backscattering coefficient.
- **Shipboard Laser Fluorometer (SLF)** - Flow-through system used to measure high spectral resolution dual wavelength laser-induced fluorescence of phytoplankton and CDOM concurrently with water Raman emission.
- **Airborne Topographic Mapper:** A laser altimeter used to measure beach erosion or deposition, and changes in Arctic ice sheets.
- **Experimental Advanced Airborne Research LIDAR** - A laser altimeter used for bathymetry in mapping coral reefs as well as measuring the height of vegetative growth.
- **Instrumentation used for Air-Sea Interaction Studies** - Participation in ongoing experiments and research in all aspects of ocean surface processes and interactions. Please visit <http://airsea.wff.nasa.gov> for more information.

- Polarimetric Research Weather Radar - New state-of-the-art portable multi-parameter S band radar used to study microphysical processes in convective storms as well as supporting validation studies for the NASA TRMM satellite.
- Instrumentation for Bio-Optical/Photophysiological Research for understanding taxonomic and physiological indicators of the phytoplankton community, examples include studying harmful algal blooms.
- Instrumentation for Upper Air Research including ozonsondes, radiosondes, aerosol LIDAR, temperature, pressure and humidity sensors.

Potential Mentors at NASA's Wallops Flight Facility

Dr. Larry F. Bliven (http://rsif.wff.nasa.gov/bliven_cv.htm)

Dr. John Gerlach

Dr. Frank E. Hoge (<http://modarch.gsfc.nasa.gov/MODIS/OCEANS/HogeBio.html>)

Mr. William B. Krabill

Dr. Steve Long

Dr. John R. Moisan

Dr. Tiffany A. Moisan

Mr. Frank Schmidlin (<http://www.spacedata.net/explorer/company/advisors/schmidlin.htm>)

Mr. Doug Vandemark

Mr. Wayne Wright

Eligibility and Selection Criteria

The program is open to students enrolled in or accepted to accredited U.S. graduate programs in the Earth sciences, physical or biological oceanography, and biological or environmental sciences disciplines. Students will be selected on the basis of academic record, demonstrated motivation and qualification to pursue multidisciplinary research in the Earth or Oceanographic sciences, clarity and relevance of stated research interests to NASA programs, and letters of recommendation. Minorities, women, and individuals with disabilities are encouraged to apply. GEST is an Affirmative Action/Equal Opportunity Employer.

Students must commit for the specific full ten-week period (June 2 - August 8, 2003). Participants must be either U.S. citizens or foreign nationals in U.S. schools who are either permanent residents or who possess a valid F1 visa. All selected students will be subject to a pre-employment security background check under the current security guidelines.

Application Material

A formal application may be obtained by contacting Anathe Brooks by mail or email (see information below). The application package should include:

1. Completed application form
2. Updated Curriculum Vitae

3. At least two letters of reference
4. Undergraduate/graduate transcripts

Compensation and Support

Students will be paid the equivalent of \$12/hour for forty hours per week over the ten-week period. In addition, GEST will reimburse reasonable domestic travel expenses for participants needing to relocate to Wallops Flight Facility, located near Chincoteague, Virginia on the Eastern Shore. Housing will be provided only for the program participants.

Deadline

Applications must be received by March 7, 2003 (flexible beyond then). Selection announcements will be made before April 4, 2003.

Contact Information

All application materials should be directed to:

L. Anathe Brooks, Assistant Director
GEST Center, Mail Code 900.1
NASA Goddard Space Flight Center
Greenbelt, MD 20771

Email: abrooks@pop900.gsfc.nasa.gov
Telephone: 301 286 4403

2003 Visiting Student Enrichment Program (VSEP)

Target:

High school, undergraduate and graduate students interested in computer science, mathematics, physics or Earth science

About the Program:

The Visiting Student Enrichment Program (VSEP) offers students summer employment with the Goddard Earth Sciences and Technology Center (GEST), working with scientists at NASA's Goddard Space Flight Center (GSFC). Student projects have included simulating neural

networks, preparing image analysis algorithms on supercomputers, developing computational science applications, and creating interactive World Wide Web sites.

Project experiences are available from June 9 to August 15 (high school students may start/stop 1-2 weeks later subject to housing availability), at GSFC in Greenbelt, MD. Students are provided opportunities to work with scientists and professionals at a world-class facility while experiencing meaningful work through a project primarily focused on computer science or the application of computers to solve problems in other sciences. VSEP also offers field trips and lectures to broaden appreciation for GSFC's mission and activities.

Possible Placements:

The following Divisions and Branches have hosted participants in previous years:

- The Scientific Computing Facility provides access to advanced computers, (i.e. a Cray T3E, Cray SV1's, SGI ORIGIN 2K and ORIGIN 3K, SUN E10000 and E6500, an IBM RS 6000 SP), the world's largest UniTree mass storage system, as well as a visualization studio. In addition, a new, even larger and more powerful supercomputer tailored to the needs of the GSFC scientific community has been purchased and will be available the first quarter of 2002. Researchers model Earth's weather, climate, and crustal dynamics, as well as space plasma and astrophysical systems.
- The National Space Science Data Center is a central repository for the large data bases generated from NASA spacecraft. Using these facilities, scientists develop space physics and astrophysics data systems, intelligent data systems, data visualization techniques, distributed data bases, and advanced technologies for mass storage. The Flight Dynamics Analysis Facility uses computers to perform mission design and determine spacecraft attitude and orbit parameters. Research is in advanced techniques for mission support and systems engineering including state-of-the-art graphics techniques and advanced software engineering.
- The Data Systems Technology Division provides a full spectrum of hardware and software environments to support applied research and development of advanced solutions to operational problems. Domains include mission operations for near-Earth unmanned scientific satellites and administrative support systems.
- Laboratory for Atmospheres researches areas such as atmospheric modeling and climate analysis in support of Earth observing systems.
- Laboratory for Hydrospheric Processes researches the oceanic, cryospheric, and hydrologic sciences.

Eligibility and Selection Criteria:

The Program is open to full-time students in computer science, the physical sciences, and mathematics. Participants must be either U.S. citizens or foreign nationals in U.S. schools who are either permanent residents or who possess a valid F-1 work visa. All selected students will be subject to a pre-employment security background check under current security guidelines.

- College: Undergraduate and graduate students must have taken courses in physical and computer sciences directly related to their areas of study.
- High School: Students will be evaluated with emphasis on their potential and related extracurricular experiences, as well as on course work. The number of positions available will be limited.

All students will be evaluated relative to their school-level peers. Participants will be selected after a competitive review. Selection criteria will be academic record, letters of reference, experience, and career goals/interest in VSEP. Funding is available for approximately 20 positions.

Application Material:

There are no formal application forms. To be considered for VSEP, please send the following application materials to GEST (see contact information below):

1. Full name and both current and permanent addresses with telephone numbers and email address, if available.
2. Social security number and proof of U.S. citizenship. Foreign students will need proof of residency and/or visa.
3. Grade level, GPA, and intended major.
4. Well-written statement of career goals and reasons for interest in VSEP.
5. Description of relevant experience.
6. Letters of reference (minimum of two).
7. Formal academic transcripts for at least the past 2 full academic years.

Compensation and Support:

Students will be made full-time temporary employees of GEST, a nonprofit research consortium. Compensation is lower for high school students than for undergraduate and graduate students and is set before students are chosen. For those students not within normal commuting distance to GSFC, the program will provide limited round-trip travel expenses and local housing.

Deadline:

Materials must be received by January 28, 2003. Selection announcements will be made on or around April 10, 2003. Transcripts and reference letters must be sent directly from the academic institution to the address below.

Contact Information:

Send the application package to:

Visiting Student Enrichment Program
GEST/Mail Code 930
NASA/Goddard Space Flight Center
Greenbelt, MD 20771

Web: <http://esdcd.gsfc.nasa.gov/VSEP/>

Email: VSEP@gsfc.nasa.gov

2003 NASA Summer School for High Performance Computational Earth and Space Sciences (HPC)**Target:**

Doctoral candidates interested in using high performance computing in their research

About the Program:

The NASA Goddard Space Flight Center's (GSFC) Earth and Space Data Computing Division (ESDCD) and the Goddard Earth Sciences and Technology Center (GEST) are soliciting applications from qualified graduate students to participate in an intensive lecture series in computational earth and space sciences during the three-week period July 7 to 25, 2003. The ESDCD provides comprehensive research and development support in data handling and computing for NASA Earth and space science research programs. Resident facilities include a 416-processor Compaq (current acquisition), a 1360-processor Cray T3E, a 512-processor SGI Origin 3000, numerous middle-sized supercomputing platforms, and several Beowulf-class systems (Beowulf is a class of inexpensive massively-parallel systems designed as a cluster of commodity PC's using LINUX, first conceived at GSFC in the 90s). The GEST Center is a consortium of the University of Maryland Baltimore County; Howard University; Hampton University; Caelum Research Corporation; and Northrop Grumman Corporation, dedicated to excellence in the earth sciences. The consortium works under a cooperative agreement with GSFC. This summer program stems from NASA's ongoing commitment to provide educational opportunities for the next generation of Earth and space scientists in the development of computational techniques and algorithms for scalable parallel computers in support of the Federal High-End Computing Program.

Approximately 15 students will be selected to participate in the three-week program. Students will be given hands-on computer training and small group interaction experience. Staff and invited computational scientists will present a series of lectures on advanced topics in computational Earth and space sciences, with emphasis on computational fluid dynamics and particle methods. Lectures will be presented on developing software for massively parallel

architectures. Students are encouraged to give a presentation of their thesis research interests during the course of the summer school.

The program aims to attract Ph.D. students in the Earth and space science disciplines whose present or future research requires large-scale numerical modeling on massively parallel architectures.

Eligibility:

Eligibility is limited to those Earth and space science students who are U.S. citizens, and are enrolled in U.S. universities.

Application Material:

There is no formal application form, but the application package should include:

1. A cover letter explaining your interest in the program and how your research will benefit from your participation
2. Your area of research and thesis title
3. A statement of your career objectives and goals
4. A description of your relevant work experience
5. Your curriculum vitae or resume with publication list
6. Your current G.P.A.
7. Two letters of reference
8. Academic transcripts showing two full years of work
9. A statement of U.S. citizenship

Compensation and Support:

Students will receive a stipend of \$1,440 (\$12 per hour) and will be reimbursed for domestic transportation to and from Greenbelt, MD. Students will be housed within commuting distance of the GSFC, and transportation to and from NASA's GSFC each day will be provided.

Deadline:

Application materials received by March 7, 2003 will receive full consideration. Selection announcements are planned by March 21, 2003.

Contact Information:

All application materials should be directed to:

Dr. Anil Deane
Email: deane@ipst.umd.edu

For more information, please visit the Earth and Space Data Computing Division (ESDCD) Web site at http://esdcd.gsfc.nasa.gov/ESS/summer_school.html

GEST Administrative Staff

One administrative staff member was hired during this reporting period, Marci Delaney, Education Program Coordinator.

Contact information of each of the GEST administrative staff members are given in Appendix T-2 following this technical report.

Position advertisements appeared in *EOS and Science*. Information concerning these advertisements is provided in Table T-2.

Table T-2 Position advertisements published during this reporting period

Advertisement	No. of Positions	Publication Date	Closing Date
EOS	1	2/4/03	2/15/03
The Chronicle of Higher Education Earthworks web site	1		2/15/03
American Meteorological Society web site	1		2/15/03

Changes in the GEST technical staff during this reporting period are provided in the following two tables, Table T-3 and Table T-4.

Table T-3 GEST technical and administrative staff hired during the reporting period

Name	Sponsor	Code
Bare, Craig	Hanson	920
Chandra, Sushel	Bhartia	916
Chandrasekar, Candra	Smith	912
Delaney, Marci	GEST Administrative Office	900.1
Gleason, Brendan	Houser	974
Kealy, Peter	Murphy	923
Lee, Myong-Lin	Rienecker	971
Olsen, Mark	Douglass	916
Wang, Halan	Lau	913
Whaler, Kathy	Goddard Visiting Fellow	900
Yang, Fanglin	Lau	913

Table T-4 GEST technical and administrative staff who have left during the present reporting period

Name	Sponsor	Code
Boy, Jean Paul	Ben Choi	926
Choi, Wookap	Goddard Visiting Fellow	916
Wang, Guiling	Bosilovich/Houser	910

At the end of the reporting period GEST had approximately 123 research staff on board.

Submitted or Published Papers by GEST Researchers During this Reporting Period

The articles submitted or published during this reporting period are listed in the Appendix T-2 at the end this section of the report.

GEST Related Seminars for this Reporting Period

Several GEST related seminars are listed in Appendix T-3 at the end of this section of the report.

Proposals Submitted by GEST Researchers During this Reporting Period

Proposals submitted by UMBC GEST research faculty are listed in Appendix T-4 at the end of this section of the report.

Appendix T-1. GEST Administrative Staff

GEST Administrative Staff as of March 31, 2003

Name	Position	Location	Telephone
Robert J. Curran	Director	UMBC/GSFC	410-455-8813 301-286-4403
Tom Low	Associate Director	UMBC/GSFC	410-455-8814 301-286-7992
L. Anathe Brooks	Assistant Director	GSFC	301-286-4226
Robert Schiffer	Chief Scientist	GSFC	410-455-8810
Debbie Hicks	Business Manager	UMBC	410-455-8815
Marci Delaney	Ed. Program Coordinator	GSFC	301-286-4403
Grace Roscoe	Executive Assistant	UMBC	410-455-8808
Nancy Flowers	Administrative Assistant II	UMBC	410-455-8812
Camilla Hyman	Administrative Assistant II	UMBC	410-455-8899

Locations:

UMBC

UMBC Technology Center, South Campus
1450 S. Rolling Road, Suite 3.002
Baltimore, MD 21227

GSFC

NASA Goddard Space Flight Center
Mail Code 900.1
Bldg, 28, Room W223
Greenbelt, MD 20771

Appendix T-2. PUBLICATIONS, January 1, 2003 –March 31, 2003

Refereed

K.R. Arsenault

Arsenault, K. R., P. R. Houser, and D. A. Matthews, Incorporating the Land Data Assimilation System into water resource management and decision support systems, *Earth Observ. Mag. – ESE Application Division Spec. Issue*, accepted for publication, 2003.

J.J. Wang

Tao, W. -K., Y. Wang, J. Qian, C. -L. Shie, K. -M. Lau, and R. Kakar, Mesoscale convective systems during SCSMEX: Simulations with a regional climate model and a cloud-resolving model, *Weather and Climate Modeling*, INDO-US Climate Research Program, in press, 2003.

Appendix T-3. SEMINARS, January 1, 2003 –March 31, 2003

Julio Bacmeister

Bacmeister, J., Rain re-evaporation and the creation of double ITCZs, paper presented at Atmospheric Model Working Group Meeting, National Center for Atmospheric Research (NCAR), Boulder Col., March, 2003.

Peter Colarco

Colarco, P. R., Dynamical and microphysical analysis of transnational pollutant transport over the Eastern United States from Canadian forest fires, seminars presented at the U. of Maryland, College Park, and the GSFC Aerocenter Seminar Series, January/February, 2003.

Colarco, P. R., and O. B. Toon, Long-range transport of mineral dust, sea salt, and smoke aerosols and their impact on CRYSTAL/FACE observations, paper presented at the CRYSTAL/FACE Science Team Meeting, Salt Lake City, Utah, February, 2003.

Mircea Grecu

Grecu, M., E. N. Anagnostou, and W.S. Olson, Investigation of uncertainties in a combined radar-radiometer retrieval algorithm using CAMEX-4 data, paper presented at EGS- American Geophysical Union (AGU)/ European Union of Geoscience (EUG) Joint Assembly, Nice, France, 6-11 April 2003.

Daniel Johnson

Tao, W. -K., C. -L. Shie, J. Simpson, D. Starr, **D. Johnson**, and Y. Sud, Precipitation processes developed during ARM (1997), TOGA COARE (1992), GATE (1974), SCSMEX (1998), and KWAJEX (1999): 2D and 3D cloud resolving model simulations, paper presented at Atmospheric Radiation Measurement Program (ARM) Science Meeting, Broomfield, Col., 2003.

David Lary

Lary, D., Chemical data assimilation: Towards an optimized Earth Observation System, paper presented at GOA - MAPSCORE - ASSET Workshop on Chemical Data Assimilation at Koninklijk Nederlands Meteorologisch Instituut (KNMI), de Bilt, The Netherlands, 15 January 2003.

Lary, D., Future objectively optimized Earth observation, invited presentation given at NASA HQ, 22 January 2003. Silver Spring, MD

Lary, D., Chemical data assimilation, invited presentation given to Agricultural Research Service, Beltsville, Md., 24 January 2003.

Ruei Fong Lin

Lin, R. -F, D. O' C. Starr, J. Reichardt, and P. J. DeMott, Nucleation in synoptically forced cirrus, paper presented at CRYSTAL-FACE Science Meeting, Salt Lake City, Utah, 24-28 February 2003.

Alexei Lyapustin

Lyapustin, A., Atmospheric radiative transfer code SHARM-3D, paper presented at The Third International Workshop on Multiangular Measurements and Models (IWMMM-3), Colorado Springs, Col., July, 2003.

Sarith Mahnama

Mahanama, S. P. P., and R. D. Koster, Intercomparison of soil moisture memory in two land surface models, paper presented at American Meteorological Society (AMS) Annual Meeting, Long Beach, Calif., February, 2003.

Jesse Meng

Meng, C. J., P. R. Houser, K. Mitchell, M. Rodell, U. Jambor, J. Gottschalk, B. Cosgrove, J. Radakovich, K. Arsenault, M. Bosilovich, J. K. Entin, J. P. Walker, H. L. Pan, and G. Gayno, Global land surface radiation budget and its impact to water and energy cycles, paper presented at American Meteorological Society (AMS) Annual Meeting, Long Beach, Calif., 10-13 February 2003.

Steven Pawson

Pawson, S., Status and evolution of GRIPS, paper presented at 2003 GRIPS Workshop, Washington, D. C., March 2003.

Randel, W. J., **S. Pawson**, The SPARC Climatology Project, paper presented at 2003 GRIPS Workshop, Washington, D. C., March, 2003.

Rolf Reichle

Reichle, R. H., and R. D. Koster, Assessing the impact of horizontal error correlations in forcing data on soil moisture estimation, paper presented at American Meteorological Society (AMS) Annual Meeting, Long Beach, Calif., February, 2003.

C. A. Schlosser

Dirmeyer, P. A., M. Zhao, and **C. A. Schlosser**, Spring and summer seasonal predictability and the land surface, paper presented at 14th Symposium on Global Change and Climate Variations, American Meteorological Society (AMS) Meeting, Long Beach, Calif., 9-13 February 2003.

Chun-Lin Shie

Chou, S. -H., E. Nelkin, J. Ardizzone, R. Atlas, and **C. -L. Shie**, Version 2 Goddard Satellite-Based Surface Turbulent Fluxes (GSSTF2), paper presented at 12th Conference on Interaction of the Sea and Atmosphere, American Meteorological Society (AMS), Long Beach, Calif., 9-13 February 2003.

Tao, W. -K., **C. -L. Shie**, J. Simpson, D. Starr, D. Johnson, and Y. Sud, Precipitation processes developed during ARM (1997), TOGA COARE (1992), GATE (1974), SCSMEX (1998), and KWAJEX (1999): 2D and 3D cloud resolving model simulations, paper presented at Atmospheric Radiation Measurement Program (ARM) Science Meeting, Broomfield, Col., 2003.

Gregory Solyar

Carpenter, K., R. G. Lyon, L. M. Mazzuca, **G. Solyar**, J. Marzouk, L. G. Mundy, J. T. Armstrong, and X. Zhang, Steps toward a large Space-based UV/Optical Fizeau Interferometer Testbed (FIT), paper presented at 201st American Astronomical Society (AAS) Meeting, Seattle, Wash., January, 2003.

Illya Zavorin

Zavorin, I., H. Stone, and J. Le Moigne, Evaluating performance of automatic techniques for subpixel registration of remotely sensed imagery, paper presented at 15th Annual Symposium on Electronic Imaging Science and Technology, International Society for Optical Engineering (SPIE), Santa Clara, Calif., 20-24 January 2003.

Appendix T-4.

Proposals Submitted & Funded – January 1, 2003 –March 31, 2003

P.I: Koratkar, Anuradha
Title: The Far UV Spectral Energy Distribution of
Quasars – FUSE
Sponsoring Agency: NASA Office of Earth Sciences (Code Y)
Budget/Commitment \$52,139

P.I. Koratkar, Anuradha
Title: Sea Simulation Pipeline
Sponsoring Agency: NASA Office of Earth Sciences (Code Y)
Budget/Commitment \$148,436

PI: Koratkar, Anuradha
Title: Idea to Observations: User Support Tools for the
Next Decade
Sponsoring Agency: NASA
Budget/Commitment \$58,707

PI: Lary, David
Title: Objectivity Optimized EOS
Sponsoring Agency: NASA ESE AIST NRA
Budget/Commitment \$777,570

PI: Lyapustin, Alexei
Title: Analysis and Validation of Aerosols and Land
Surface EDRs from VIIRS
Sponsoring Agency: NASA
Budget/Commitment \$425,780

PI: Pap, Judit
Title: Study of EUV and UV Irradiance Variations and
Their Atmospheric Effects Using Full Disk and
Spatially Resolved Measurements

Sponsoring Agency: NASA
Budget/Commitment \$187,778

PI: Wu, Yihua
Title: Numerical Investigation of Soil Moisture and
Temperature Effects on the Spatial Pattern of
Biogenic Emissions

Sponsoring Agency: U.S. Environmental Protection Agency
Budget/Commitment \$266,681

Business Status Report

Amendments Received During this Reporting Period

Four amendments to the Cooperative Agreement were received during the present reporting period. At the start of the reporting period a total of \$21,276,649 was obligated to the Cooperative Agreement. As of 3/31/03 the total financial obligation was \$24,327,763. Table B.1 gives an overview of these amendments.

Table B.1. Amendments to NCC5-494, received between 1/1/03 and 3/31/03.

Amendment Number	Date	Amount	Activities Added/Augmented	Activities Deleted
44	1/17/03	\$21,276,649	2	0
45	2/20/03	\$22,579,694	3	0
46	3/20/03	\$24,327,763	4	0

The attached Table B.2 gives a detailed breakdown of the new or augmented activities in amendments 44, 45, and 46.

Summary of Account Activity

The most recent cost analysis for GEST, giving actual costs accrued during the reporting period was dated 3/31/03. Table B.3 gives a detailed breakdown, by task number of the costs incurred, the approved budget and remaining balance, during the reporting period.

TABLE B-3. DETAILED COST BREAKDOWN FOR THE LAST THREE MONTHS OF THE REPORTING PERIOD

GEST Monthly Cost Analysis - January 1, 2003 - March 31, 2003

GEST Task # and Sponsor	FAS Number	A	Salary	C	T	Subcontract	U	A	Contractual	L	ODC	Total Direct Costs	Indirect	Total Costs	1/1/03-3/31/03	Cumulative Expenses	Total Expenses	Funding To Date	Average Monthly Burn Rate	Projected Costs through 6/30/02	Balance Remaining as of 3/31/03
#931-00-001 Macle		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
#971-00-002 Riemer/Adams	05-5-15645	71,311	20,759	-2,574	0	0	60	0	60	0	0	89,616	17,923	107,539	1,745,688	1,638,149	1,745,688	2,117,616	0	0	471,928
#931-00-003 Palin		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
#930-00-004 Mitchell		0	0	0	0	0	0	0	0	0	0	0	0	0	0	56,494	56,494	56,494	0	0	0
#902-00-005 Olsen		9,349	2,634	364	0	0	0	0	0	0	0	12,347	2,469	14,816	445,835	460,651	484,625	0	0	0	23,974
#902-00-006 Olsen		20,657	6,247	347	0	0	168	0	0	0	0	27,419	5,484	32,903	414,762	447,665	594,056	0	0	0	56,391
#910-01-008 Hou/Rood		28,887	9,111	0	0	0	0	0	0	0	0	37,998	7,600	45,598	323,154	368,752	345,016	0	0	0	(23,736)
#910-01-009 Altier/Hou		19,041	6,366	582	0	0	0	0	0	0	0	25,989	5,198	31,187	318,771	318,771	312,285	0	0	0	(6,486)
#910-01-010 Altier		24,144	6,558	2,781	0	0	0	0	0	0	0	33,783	6,757	40,540	353,967	394,507	369,783	0	0	0	(24,723)
#910-01-011 Spillhorne		14,958	4,599	0	0	0	0	0	0	0	0	19,557	3,911	23,468	399,712	423,180	416,084	0	0	0	(7,096)
#912-01-012 Spillhorne		13,809	4,569	0	0	0	0	0	0	0	0	18,378	3,676	22,054	169,375	191,451	218,484	0	0	0	27,055
#910-01-014 Schubert		23,421	5,552	1,435	0	0	0	0	0	0	0	30,208	6,042	36,250	255,201	291,451	472,457	0	0	0	181,006
#916-01-016 Kava		16,035	5,148	843	0	0	0	0	0	0	0	22,218	4,444	26,662	110,032	136,694	206,811	0	0	0	70,117
#916-01-017 Bharti		1,992	154	1,377	0	0	0	0	0	0	0	3,513	717	4,230	30,448	34,678	50,016	0	0	0	15,338
#921-01-018 Frey		16,494	2,472	662	0	0	0	0	0	0	0	19,628	4,162	23,790	311,916	335,706	283,747	0	0	0	(51,960)
#923-01-019 Deering - CAELUM		0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,750	16,750	19,202	0	0	2,452
#930-01-020 Fischer - CAELUM		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,743	1,743	1,743	0	0	33
#930-01-021 Fischer		0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,277	17,277	57,277	0	0	40,000
#935-01-022 Dorband		17,231	5,031	0	0	0	0	0	0	0	0	22,764	4,553	27,317	271,134	298,451	297,461	0	0	0	(990)
#930-01-023 Fischer		14,792	3,554	57	0	0	0	0	0	0	0	18,803	3,761	22,564	355,829	378,393	338,261	0	0	0	(40,132)
#930-01-024 Fischer		0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,731	3,731	28,300	0	0	24,569
#912-02-027 Heynfield		13,203	2,271	483	0	0	0	0	0	0	0	15,957	3,191	19,148	180,650	199,808	260,871	0	0	0	61,063
#912-02-029 Tuo		14,223	4,584	0	0	0	0	0	0	0	0	18,807	3,761	22,568	214,169	236,737	253,016	0	0	0	16,279
#912-02-034 Tuo/Geir		0	0	0	0	0	0	0	0	0	0	0	0	0	0	49,019	49,019	51,269	0	0	2,250
#913-02-035 Chao		12,179	4,608	1,356	0	0	0	0	0	0	0	18,143	3,629	21,772	166,435	188,207	231,047	0	0	0	42,840
#912-02-036 Start		12,447	3,456	0	0	0	0	0	0	0	0	15,903	3,181	19,084	175,938	195,022	215,132	0	0	0	20,110
#913-02-037 Lau - CAELUM		0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,149	11,149	27,397	0	0	16,248
#913-02-038 Kaufman - CAELUM		0	0	424	0	0	0	0	0	0	0	424	90	514	88,545	89,059	205,860	0	0	0	116,801
#971-02-040 Hakkinen		16,167	4,575	0	0	0	0	0	0	0	0	20,742	4,148	24,890	204,021	228,911	228,837	0	0	0	(74)
#900-03-041 Klog		0	0	0	0	0	0	0	0	0	0	0	0	0	0	136,720	136,720	115,587	0	0	(21,133)
#910-03-042 Cohn - CAELUM		0	0	1,675	0	0	0	0	0	0	0	1,675	335	2,010	28,787	30,797	33,427	0	0	0	2,640
#910-03-043 Richards - CAELUM		1,000	78	526	0	0	0	0	0	0	0	1,604	321	1,925	75,840	77,765	70,509	0	0	0	(7,256)
#910-03-047 Richards		71,339	19,352	6,262	0	0	14	0	14	0	0	96,967	19,393	116,360	483,892	600,252	481,649	0	0	0	(118,603)
#912-03-064 Negri - CAELUM		0	0	445	0	0	0	0	0	0	0	445	89	534	11,797	12,331	13,281	0	0	0	950
#913-03-065 Lau		0	0	0	0	0	0	0	0	0	0	0	0	0	0	36,227	36,227	39,092	0	0	2,865
#913-03-066 Lau		0	0	0	0	0	0	0	0	0	0	0	0	0	0	41,698	41,698	42,347	0	0	649
#923-03-067 Holben		54,741	18,670	2,701	0	0	21	0	0	0	0	76,133	15,227	91,360	601,280	692,640	860,250	0	0	0	167,610
#930-03-068 Halem		17,616	3,448	0	0	0	0	0	0	0	0	21,264	4,253	25,517	306,541	332,058	342,820	0	0	0	19,762
#935-03-069 Coronado/Shamann		0	0	0	0	0	0	0	0	0	0	0	0	0	0	126,107	126,107	142,111	0	0	16,004
#974-03-070 Houer		172,354	49,284	10,739	0	0	120	0	162	0	0	232,659	42,609	275,268	1,796,903	2,072,171	1,834,643	0	0	0	(237,528)
#993-04-073 Reiter		0	0	0	0	0	0	0	0	0	0	0	0	0	0	19,783	19,783	20,802	0	0	1,019
#910-04-074 Reed		23,145	6,798	941	0	0	0	0	0	0	0	30,884	6,177	37,061	378,589	415,650	381,834	0	0	0	(33,816)
#916-04-076 Herman/Krueger		17,952	6,066	825	0	0	0	0	0	0	0	24,843	4,969	29,812	328,724	258,536	354,212	0	0	0	95,676
#930-04-077 Halem		0	0	0	0	0	0	0	0	0	0	0	0	0	0	50,726	50,726	28,351	0	0	(22,376)
#586-05-081 Banks		1,200	0	0	0	0	0	0	0	0	0	1,200	240	1,440	96,244	97,684	100,000	0	0	0	2,316
#910-05-082 Reed		156	38	0	0	0	0	0	0	0	0	194	39	233	128,087	128,320	142,464	0	0	0	14,144
#130-05-083 Gabrya		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(14,656)	0	0	0	(14,656)
#550-05-084 Lyon		0	0	0	0	0	0	0	0	0	0	0	0	0	0	54,281	54,281	89,281	0	0	35,000
#910-05-085 Gabrya		31,045	4,767	1,865	0	0	426	0	55	0	0	38,158	11,614	49,772	380,310	430,082	520,536	0	0	0	90,454
#974-05-086 Chang		15,639	4,626	297	0	0	1,160	0	0	0	0	21,722	4,344	26,066	226,376	252,442	343,601	0	0	0	91,158
#550-06-087 Lyon		16,131	5,871	297	0	0	0	0	0	0	0	22,299	4,460	26,759	260,273	287,032	306,157	0	0	0	19,125

TABLE B-3. DETAILED COST BREAKDOWN FOR THE LAST THREE MONTHS OF THE REPORTING PERIOD

GEST Monthly Cost Analysis - January 1, 2003 - March 31, 2003

GEST Task # and Sponsor PAS Number	A Salary	C Fringe	T Travel	Subcontracts	U Supplies	A Publications	Contractual	L Equipment	ODC	Total		Total Costs 1/1/03-3/31/03	Cumulative Expenses	Total Expenses	Funding To Date	Average Monthly Burn Rate	Projected Costs through 6/30/02	Balance Remaining as of 3/31/03
										Direct Costs	Indirect							
#912-06-088 Spillhorne	13,020	3,444	339	0	0	0	0	0	0	16,803	3,261	20,164	189,608	209,772	242,592	0	0	32,820
#910-06-091 Schubert	0	0	0	0	0	0	0	0	0	0	0	0	22,408	22,408	22,735	0	0	327
#913-06-092 Tucker	14,358	3,639	0	0	2,501	0	0	0	0	20,498	4,100	24,598	205,215	219,813	193,443	0	0	(36,370)
#935-06-094 Le Moigne	0	0	0	0	0	0	0	0	0	0	0	0	7,226	7,226	10,000	0	0	2,674
#916-07-096 Chao - CAELUM	9,120	709	0	0	0	0	0	0	0	9,829	1,966	11,795	8,440	20,635	33,337	0	0	12,702
#641-08-097 Bowers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(35,000)	0	0	(35,000)
#910-08-098 Hou	5,078	1,186	0	0	0	0	0	0	0	6,264	1,253	7,517	93,879	101,396	131,803	0	0	30,407
#910-08-099 Atlas	29,266	10,132	0	0	0	0	0	0	0	39,398	7,880	47,278	373,121	420,399	443,072	0	0	22,673
#910-08-100 da Silva	0	0	0	0	0	0	0	0	0	0	0	0	49,510	49,510	51,509	0	0	1,999
#916-08-101 Herman	12,012	4,076	3,651	0	784	0	0	0	0	20,523	4,105	24,628	159,675	184,303	262,200	0	0	77,897
#930-08-102 Galvys	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,267	0	0	10,267
#902-09-103 Olsen	0	0	0	0	0	0	0	0	0	0	0	0	209,667	209,667	212,067	0	0	2,400
#970-09-104 Ormsby - CAELUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
#970-09-105 Ormsby - CAELUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
#971-09-106 Bindachadler	0	0	0	0	0	0	0	0	0	0	0	0	31,659	31,659	35,800	0	0	4,141
#971-10-107 Liu	0	0	0	0	0	0	0	0	0	0	0	0	8,208	8,208	33,788	0	0	25,580
#912-10-108 Spillhorne	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
#912-10-109 Tao	14,544	5,511	0	0	0	0	0	0	0	20,055	4,011	24,066	170,115	194,181	186,505	0	0	(7,676)
#931-10-110 Ziesak/Fletcher	0	0	0	0	0	22	22	0	0	22	0	22	79,609	79,631	135,385	0	0	55,754
#931-10-111 Lawrence	0	0	1,931	0	0	0	0	0	0	1,931	386	2,317	27,452	30,169	183,500	0	0	153,331
#903-11-112 Retting	0	0	0	0	0	0	0	0	0	0	0	0	117,237	117,237	114,657	0	0	(2,580)
#935-11-113 LeMoigne	5,928	461	0	0	0	0	0	0	0	6,389	1,278	7,667	41,498	49,565	50,187	0	0	622
#930-11-114 Mack/Hansen	0	0	0	0	0	0	0	0	0	0	0	0	163,609	163,609	165,130	0	0	1,521
#930-12-115 Spicer	19,722	5,700	0	0	0	0	0	0	0	25,422	5,084	30,506	213,611	244,117	248,071	0	0	23,954
#912-10-116 Tao	16,479	5,379	0	0	0	0	0	0	0	21,858	4,372	26,230	180,005	206,235	194,894	0	0	(11,341)
#913-12-117 Lau	24,741	7,824	0	0	0	0	2,176	0	0	34,741	6,948	41,689	133,467	175,156	191,768	0	0	16,612
#913-12-118 Wicombé	0	0	0	0	0	0	0	0	0	0	0	0	87,466	87,466	87,711	0	0	87,711
#972-13-119 Vandemark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,154	0	0	17,154
#971-13-120 Tay	17,169	4,613	470	0	0	0	0	0	0	22,252	4,450	26,702	188,761	215,463	247,750	0	0	32,287
#916-13-121 Gleason	15,318	3,957	0	0	0	0	0	0	0	19,275	3,855	23,130	171,483	194,613	188,008	0	0	(6,605)
#423-14-122 Behrke	0	0	0	0	0	0	0	0	0	0	0	0	23,611	23,611	50,000	0	0	26,389
#910-14-123 Schubert	16,755	5,373	0	0	0	0	0	0	0	22,128	4,436	26,564	139,980	166,534	163,946	0	0	(2,588)
#910-14-124 Hou	15,318	3,892	0	0	0	0	0	0	0	19,210	3,842	23,052	150,665	173,717	139,845	0	0	(33,872)
#910-14-125 Lin	14,121	3,600	0	0	0	0	0	0	0	17,721	3,544	21,265	98,805	120,070	102,171	0	0	(17,899)
#975-14-126 Kim	0	0	0	0	0	0	0	0	0	0	0	0	8,925	8,925	8,946	0	0	21
#935-16-127 LeMoigne	0	0	5,000	0	0	0	0	0	0	5,000	0	5,000	15,205	20,205	28,421	0	0	8,216
#930-16-128 Deglan	0	0	0	0	0	0	0	0	0	0	0	0	62,155	62,155	62,223	0	0	68
#912-16-129 Braun	12,426	3,735	0	0	0	0	0	0	0	16,161	3,232	19,393	53,460	72,853	130,517	0	0	57,664
#913-18-130 Bel	15,318	2,637	0	0	0	0	0	0	0	17,955	3,591	21,546	116,300	137,846	150,199	0	0	12,353
#912-19-131 Heynfield	14,361	5,010	1,027	0	0	0	0	0	0	20,398	4,080	24,478	129,728	154,206	221,598	0	0	67,392
#926-19-132 Chao, Ben	7,180	1,400	0	0	0	0	0	0	0	8,580	1,716	10,296	79,715	90,011	83,500	0	0	(6,511)
#915-19-133 Niemann	0	0	0	0	0	0	0	0	0	0	0	0	3,033	3,033	100,000	0	0	96,967
#915-19-134 LeMoigne	9,095	4,347	718	0	950	0	0	0	0	15,110	2,987	18,097	96,972	112,082	123,902	0	0	11,820
#910-19-135 Pawson	11,736	2,454	747	0	0	0	0	0	0	14,937	2,987	17,924	61,008	78,932	79,379	0	0	447
#900-19-136 King	0	0	0	0	0	0	0	0	0	0	0	0	72,855	72,855	75,500	0	0	2,645
#971-20-137 Koblusky	12,657	4,686	1,184	0	0	0	0	0	0	18,527	3,705	22,232	57,556	79,788	77,500	0	0	(2,288)
#910-20-138 DaSilva	13,188	5,358	839	0	0	0	0	0	0	19,385	3,877	23,262	94,085	117,347	163,148	0	0	45,801
#912-21-140 Adler	12,312	3,435	0	0	0	0	0	0	0	35,747	3,149	18,896	43,933	62,829	115,755	0	0	52,926
#900-21-141 Meeson	0	0	0	0	0	0	0	0	0	0	0	0	5,576	5,576	24,765	0	0	19,189
#924-21-142 Whiteman	9,129	3,210	0	0	0	0	0	0	0	12,339	2,468	14,807	83,853	98,660	104,766	0	0	6,106
#972-21-143 Gerlach	6,277	1,161	0	0	0	0	18	0	0	7,456	1,841	9,297	50,058	59,355	193,450	0	0	134,095
#916-21-144 Chandra	13,923	3,690	0	0	0	0	0	0	0	17,613	3,523	21,136	67,347	88,483	199,578	0	0	111,095
#912-21-145 Adler	12,657	4,956	0	0	0	0	0	0	0	17,613	3,523	21,136	74,706	95,842	206,697	0	0	110,855
#913-21-146 Chahnan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40,000	0	0	40,000

TABLE B-3. DETAILED COST BREAKDOWN FOR THE LAST THREE MONTHS OF THE REPORTING PERIOD

GEST Monthly Cost Analysis - January 1, 2003 - March 31, 2003

GEST Task # and Sponsor		A	C	T	Subcontract	U	A	Contractual	L	ODC	Total Direct Costs	Indirect	Total Costs	1/03-3/31/03	Cumulative Expenses	Total Expenses	Funding To Date	Average Monthly Burn Rate	Projected Costs through 6/30/02	Balance Remaining as of 3/31/03
PAS Number		Salary	Fringe	Travel		Supplies	Publications		Equipment											
#912-33-147	Smith, E.	30,350	5,094	2,835	0	2,200	0	0	0	0	40,479	13,953	54,432	54,432	165,318	219,750	397,618	0	0	177,868
#920-35-148	Carter, D.	0	0	0	0	0	0	0	0	0	0	0	0	0	128	128	7,500	0	0	7,372
#971-36-149	Hakkinen	11,460	2,337	242	0	0	0	0	0	0	14,039	0	14,039	14,039	44,429	58,468	110,646	0	0	52,178
#920-35-150	Houser	9,358	672	100	0	0	0	34	0	0	10,164	2,032	12,196	12,196	26,652	38,848	42,040	0	0	3,192
#900-39-151	King	13,875	5,184	0	0	0	0	0	0	0	19,659	3,812	22,471	22,471	78,824	101,695	202,805	0	0	101,110
#912-39-152	Tao	22,785	5,889	0	0	0	0	0	0	0	28,674	5,735	34,409	34,409	79,824	114,233	136,000	0	0	21,767
#930-30-153	Mack/Halem	0	0	0	0	0	0	0	0	0	0	0	0	0	182,100	182,100	126,806	0	0	55,294
#975-31-154	Kim	0	0	998	0	0	0	0	0	23	1,021	0	1,021	1,021	2,811	3,832	76,839	0	0	73,007
#910-31-155	Gebro	24,165	6,597	1,589	0	0	0	28	0	0	32,379	6,476	38,855	38,855	81,028	119,883	107,548	0	0	12,335
#970-31-156	Barnes	4,883	0	0	0	0	0	0	0	0	4,883	2,882	7,765	7,765	47,795	55,560	39,482	0	0	16,078
#912-31-157	Whiteman	4,545	560	0	0	0	0	470	0	0	5,575	1,115	6,690	6,690	50,358	57,048	60,000	0	0	2,952
#975-32-159	Menghini	16,596	0	0	0	0	0	0	0	0	16,596	9,794	26,390	26,390	49,219	75,609	85,036	0	0	9,427
#972-32-160	Gerlach	0	0	0	0	0	0	0	0	0	0	0	0	0	70,688	70,688	73,501	0	0	2,813
#971-32-161	Liu	15,039	0	940	0	0	0	0	0	0	15,979	9,011	24,990	24,990	51,114	76,104	119,633	0	0	43,529
#923-32-162	Privette	27,219	4,953	0	0	0	0	0	0	0	32,172	6,434	38,606	38,606	79,580	118,186	100,000	0	0	18,186
#935-32-163	Lyon	6,622	1,217	0	0	900	0	0	0	0	8,739	1,748	10,487	10,487	62,508	72,995	90,001	0	0	17,006
#903-33-165	Reiling	0	0	0	0	0	0	0	0	0	0	0	0	0	104,036	104,036	111,129	0	0	7,093
#930-33-166	Spicer, E.	0	0	0	0	0	0	0	0	0	0	0	0	0	55,873	55,873	58,151	0	0	2,278
#975-34-167	LeVine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000	0	0	30,000
#900-35-168	Maynard, N	14,454	0	0	0	0	0	0	0	0	14,454	8,530	22,984	22,984	45,894	68,878	155,359	0	0	86,481
#972-37-169	Vandemark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	133,045	0	0	133,045
#923-37-170	Privette	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100,000	0	0	100,000
#912-37-171	Tao	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
#900-37-172	Richards	0	0	272	0	0	0	2,453	0	0	2,725	545	3,270	3,270	39,520	42,790	168,650	0	0	125,860
#916-37-173	Douglas	13,433	3,919	0	0	0	0	0	0	0	17,352	3,470	20,822	20,822	344	21,166	129,396	0	0	108,230
#913-37-174	Kaufman	0	0	11,516	0	0	0	0	0	0	11,516	1,160	12,676	12,676	25,319	37,995	76,200	0	0	38,205
#900-39-175	Murphy	29,809	5,925	3,367	0	0	0	0	0	0	39,101	0	39,101	39,101	36,007	75,108	105,000	0	0	29,892
#916-39-176	Kawa	0	0	0	0	0	0	0	0	0	0	0	0	0	582	582	32,517	0	0	31,935
#912-42-178	Lawrence	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000	0	0	20,000
#693-42-179	Reuter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52,216	0	0	52,216
#903-42-180	Reiling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,000	0	0	9,000
#916-43-181	Bharia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69,408	0	0	69,408
#913-43-182	Lau	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	942	0	0	942
#974-44-183	Lidard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66,319	0	0	66,319
#974-44-184	Lidard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	295,806	0	0	295,806
#888-45-185	Breed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000	0	0	30,000
#933-46-186	Mack	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28,544	0	0	28,544
#931-46-187	Chue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50,000	0	0	50,000
#923-46-188	Privette	2,654	0	0	0	0	0	0	0	0	2,654	1,566	4,220	4,220	0	0	105,000	0	0	105,000
Totals		1,423,203	380,462	72,475	0	9,290	0	5,492	0	23	1,890,945	389,578	2,280,523	2,280,523	17,925,925	20,302,228	24,327,763	0	0	4,213,001